

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
26 February 2004 (26.02.2004)

PCT

(10) International Publication Number  
**WO 2004/017322 A1**

(51) International Patent Classification<sup>7</sup>: **G11B 23/03**

J. [GB/GB]; c/o Philips Intellectual Property & Standards,  
Cross Oak Lane, Redhill, Surrey RH1 5HA (GB).

(21) International Application Number:

PCT/IB2003/003347

(74) Agent: **WILLIAMSON, Paul, L.**; Philips Intellectual  
Property & Standards, Cross Oak Lane, Redhill, Surrey  
RH1 5HA (GB).

(22) International Filing Date: 29 July 2003 (29.07.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

0218858.9 14 August 2002 (14.08.2002) GB  
0307478.8 1 April 2003 (01.04.2003) GB

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,  
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(71) Applicant (*for all designated States except US*): **KONIN-  
KLJKE PHILIPS ELECTRONICS N.V.** [NL/NL];  
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

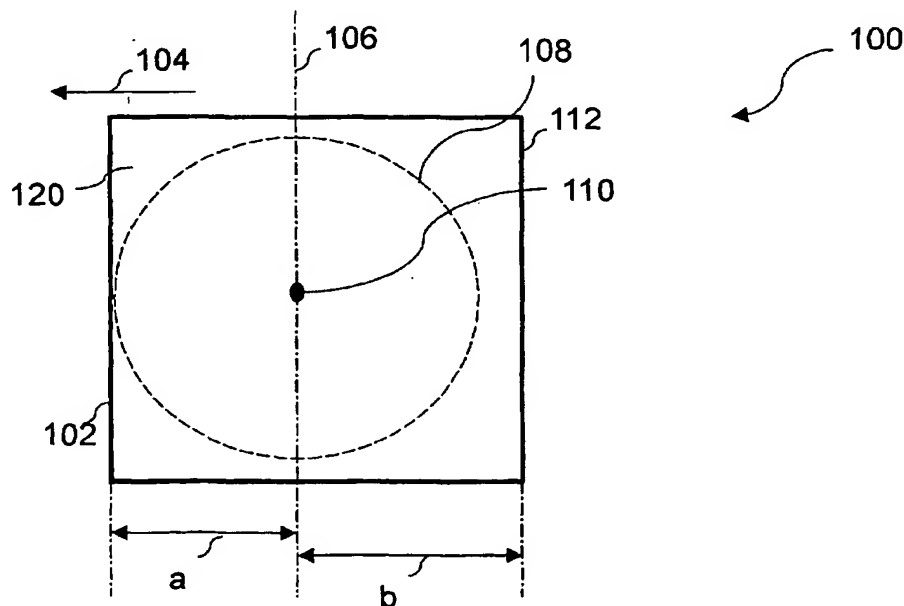
(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): **PHILPOT, Timothy,**

[Continued on next page]

(54) Title: DISC CARTRIDGE



(57) Abstract: A disc cartridge comprising a planar casing (120) and a disc shaped media (108) accommodated therein is disclosed wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge (102) of the casing through an aperture of such a disc drive in a direction (104) in the plane of the casing; and wherein the distance (b) from a trailing edge (112) of the casing (being that furthest from the leading edge) to an imaginary line (106) which is in the plane of the casing, perpendicular to the direction of insertion (104) and passes through the centre (110) of the disc shaped media (108) is at least 10% greater than the distance (a) from the leading edge (102) of the casing to the imaginary line (106).

WO 2004/017322 A1



SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report*

**(48) Date of publication of this corrected version:**

17 February 2005

**(15) Information about Correction:**

see PCT Gazette No. 07/2005 of 17 February 2005, Section II

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## DESCRIPTION

## DISC CARTRIDGE

5           This invention relates to a disc cartridge comprising a planar casing and a disc shaped media accommodated therein wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge of the casing through an aperture of such a disc drive in a direction in the plane of the casing.

10

Such disc cartridges, in respect of which the casing protects the media from handling, dust and the like, are well known including, for example, a conventional floppy disk for a PC.

Typically, to minimise the physical size of such cartridges, the dimensions of casings are only slightly larger than the diameter of disc shaped media accommodated therein. For example, where such a cartridge is square or slightly rectangular, straight edges are only slightly larger than the diameter of the disc shaped media. Similarly, in respect of "D" shaped casings, known from US Patent 6,205,116, the single straight edge is only slightly larger than the diameter of the disc shaped media and the curved edge follows the media's circumference.

20

It is an object of the invention to improve on the known art.

25           In accordance with the present invention, a disc cartridge of the type described above is provided wherein the distance from a trailing edge of the casing (being that furthest from the leading edge) to an imaginary line which is in the plane of the casing, perpendicular to the direction of insertion and passes through the centre of the disc shaped media is at least 10% greater than the distance from the leading edge of the casing to the imaginary line.

30

The inventor has appreciated that a disadvantage of conventional cartridges is that they may not be readily handled without incidental handling

of sensitive components of the casing such as the shutter, thereby potentially exposing the shutter and / or the disc media to damage. This is particularly so when a disc cartridge is small. The asymmetry in accordance with the present invention improves handling of such cartridges.

5           The asymmetry also enables the orientation of a cartridge to be readily ascertained thereby simplifying insertion of such a cartridge in a disc drive.

Furthermore, the asymmetry may also simplify ejection if the trailing edge of the cartridge at least partially protrudes from a disc drive whereby it can be manually gripped to remove the cartridge from the disc drive.

10           The distance from the trailing edge of the casing to the imaginary line may be at least 25%, 50% or even 80% greater than the distance from the leading edge of the casing to the imaginary line.

Advantageously, the casing proximate to the trailing edge permits the use of a more efficient shutter arrangement such that when the cartridge is in  
15 use in the drive unit, the casing has only a single layer of protection for the portion of the disc shaped media not exposed for access by a head.

The present invention will now be described, by way of example only, with reference to the accompanying figures in which:

20           Figure 1 shows, schematically, a first disc cartridge;  
            Figure 2 shows, schematically, a second disc cartridge;  
            Figure 3 shows, schematically, a third disc cartridge; and  
            Figure 4 shows, schematically, a fourth disc cartridge.

25           Figure 1 depicts a first disc cartridge, shown generally at 100. The cartridge comprises a planar casing 120 accommodating disc shaped media 108. The planar casing comprises a leading edge 102 corresponding to the direction of insertion 104 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 102 to an imaginary line 106  
30 which is in the plane of the casing perpendicular to the direction of insertion 104 and passes through the centre 110 of the disc shaped media 108. A distance 'b' is calculated from the imaginary line 106 to trailing edge 112 of the

casing, the trailing edge 112 being that edge of the casing furthest from the leading edge 102. Distance 'b' is at least 10% greater than distance 'a'.

A user can establish the orientation of a disc cartridge by means of one or more visual clues. Consider the 3.5inch floppy disk commonly used in PCs, such clues include identifying a side of the disk by means of the metal drive coupling plate, the leading (insertion) edge by means of the shutter and of course the arrow symbol located near a corner of the casing. As new types of disc cartridge are developed, the provision of suitable visual clues to determine orientation is highly desirable. However, the trend to smaller sized disc media and corresponding cartridge size reduction, especially for compact mobile products, will mean that visual clues will be smaller and therefore less easy to discern. Furthermore, as data density increases (i.e. bytes per unit area), the need to protect media from dust and dirt contamination means that, when not in use, the disc media may be fully enclosed, thereby potentially removing one or more clues (e.g. the drive coupling plate). The present invention recognises and solves this problem by providing a suitable visual clue for any type of disc cartridge, the clue being inherently familiar to any user and having physical properties which provide further advantages in terms of performance and manual handling, as discussed in more detail below. It has been found that when distance 'b' is at least 10% greater than distance 'a' a user is able to readily establish the orientation of the cartridge for example in order to insert the cartridge into a suitable drive unit.

Figure 2 depicts, schematically, a second disc cartridge shown generally at 200. The cartridge comprises a planar casing 220 accommodating disc shaped media 208. The planar casing comprises a leading edge 202 corresponding to the direction of insertion 204 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 202 to an imaginary line 206 which is in the plane of the casing perpendicular to the direction of insertion 204 and passes through the centre 211 of the disc shaped media 208. A distance 'd' is calculated from the imaginary line 206 to trailing edge 212 of the casing, the trailing edge 212 being that edge of the casing furthest from the leading edge 202. The cartridge further comprises a

shutter 210 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' and in a direction opposite to the direction of insertion so as to expose a portion of the disc media for access by a head. When fully open, the edge 213 of shutter 210 is located at line 214. Clearly, the above arrangement applies to other types of shutter, including those which expose a radius of the disc media. Distance 'd' is determined in order to allow a suitably sized handling region 216 to be formed proximate to the trailing edge. The presence of the handling region facilitates at least two functions : a visual clue as to the orientation of the cartridge and also a means to manually handle the cartridge. As shown in the figure, region 216 does not overlap the disc 208 or the opened shutter (the edge 213 of which being located at 214); such an arrangement can help protect the disc and/or shutter from handling damage. Unlike prior art disc cartridges, region 216 allows the cartridge to be handled along one entire edge of the cartridge without risking consequent damage to the disc. Distance 'd' could be arranged to allow manual handling using finger and thumb, for example 'd' is approximately 9mm larger than the radius of the disc media. As an example, disc media with a 15mm radius might result in a cartridge casing where distance 'd' is around 50% greater than distance 'a'. The embodiment shown allows the cartridge to be handled for insertion into a drive unit. In the case where a cartridge has been loaded into the drive unit, its trailing edge may suitably be arranged to protrude from the drive unit thereby allowing a user to manually eject the cartridge from the drive unit by means of gripping region 216. Alternative cartridge ejection means may be provided.

Figure 3 depicts, schematically, a third disc cartridge shown generally at 300. The cartridge comprises a planar casing 320 accommodating disc shaped media 308. The planar casing comprises a leading edge 302 corresponding to the direction of insertion 304 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 302 to an imaginary line 306 which is in the plane of the casing perpendicular to the direction of insertion 304 and passes through the centre 311 of the disc shaped media 308. A distance 'e' is calculated from the imaginary line 306 to trailing edge 312 of the

casing, the trailing edge 312 being that edge of the casing furthest from the leading edge 302. The cartridge further comprises a shutter 310 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' and in a direction opposite to the direction of insertion so as to expose a portion of the disc media. When the shutter 310 is in its closed position (as shown in Figure 3), region 316 is available for determining orientation and allowing handling, as discussed earlier. Inserting the cartridge into the drive might be performed by initially inserting the cartridge into the drive and then completing the insertion by pushing its trailing edge using a thumb or finger. When the cartridge is fully inserted into the drive unit, the shutter overlaps and conceals region 316. This could act as a useful visual indication that the cartridge is fully inserted into the drive; it might also help prevent the drive being removed in an uncontrolled way (e.g. by a user simply manually grasping and removing the cartridge) as a consequence help ensure data integrity. Instead, an ejection means can be provided on the drive unit whereby, when operated, the cartridge is partially ejected from the drive unit; this causes the shutter 310 to partially or fully close and thereby reveal at least a part of region 316 which can then be gripped by a user to complete the ejection of the cartridge from the drive unit. Optionally, the trailing edge of a fully inserted cartridge can be designed to seal the aperture of the disc drive using means readily identifiable by persons skilled in the art. Furthermore, the arrangement described allows cartridges to be constructed such that, in use in the drive unit, the casing comprises a single layer of protection for the portion of the disc shaped media not exposed for access by a head. This contrasts with, for example, the standard 3.5inch PC floppy disk in which a portion of the disk has a two layer covering when loaded into a suitable disk drive unit. An advantage is that the dimension perpendicular to the plane of the cartridge can be reduced which in turn allows a reduction in the size of the corresponding disc drive – an important factor for small form factor media and mobile products. Another advantage is a potentially low cost cartridge due to less parts, materials and simple construction. Clearly, the above arrangement can also apply to other types of

shutter, including those which expose a radius of the disc media. Consider an example of a cartridge accommodating a disc media with radius 15mm. Presuming dimension 'c' is 9mm, distance 'e' is likely to be approximately 25% greater than distance 'a'.

5        Figure 4 depicts, schematically, a fourth disc cartridge shown generally at 400. The cartridge comprises a planar casing 420 accommodating disc shaped media 408. The planar casing comprises a leading edge 402 corresponding to the direction of insertion 404 of the cartridge into a corresponding drive unit. A distance 'a' is calculated from the leading edge 402  
10    to an imaginary line 406 which is in the plane of the casing perpendicular to the direction of insertion 404 and passes through the centre 411 of the disc shaped media 408. A distance 'f' is calculated from the imaginary line 406 to trailing edge 412 of the casing, the trailing edge 412 being that edge of the casing furthest from the leading edge 402. The cartridge further comprises a  
15    shutter 410 (denoted by the heavy outline) which, when inserted into a drive unit, is slideably moveable in the plane of the casing by a distance 'c' in a direction opposite to the direction of insertion so as to expose a portion of the disc media, edge 413 of the shutter being positioned at 414 when the shutter is fully open. Region 416 can be used to handle the cartridge irrespective of  
20    whether the shutter is closed or open. Suitably, when the cartridge is fully inserted into the disk drive, region 416 remains exposed and can be used for example to manually eject the cartridge by grasping region 416 and withdrawing the cartridge from the disc drive. Consider an example of a cartridge accommodating a disc media with radius 15mm. Presuming  
25    dimension 'c' is 9mm and assuming a similar sized region 416 compared to region 216 in the embodiment of Figure 2, distance 'f' is in this example approximately 80% greater than distance 'a'.

The foregoing implementations are presented by way of example only and represent a selection of a range of implementations that can readily be  
30    identified by a person skilled in the art to exploit the advantages of the present invention. Disc cartridges other than those which are rectangular can also



embody the invention, for example a disc cartridge wherein one or more edges are arcuate.

In the description above and with reference to Figure 1 there is disclosed a disc cartridge comprising a planar casing 120 and a disc shaped media 108  
5 accommodated therein is disclosed wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge 102 of the casing through an aperture of such a disc drive in a direction 104 in the plane of the casing; and wherein the distance 'b' from a trailing edge 112 of the casing (being that furthest from the leading edge) to an imaginary line 106  
10 which is in the plane of the casing, perpendicular to the direction of insertion 104 and passes through the centre 110 of the disc shaped media 108 is at least 10% greater than the distance 'a' from the leading edge 102 of the casing to the imaginary line 106.

## CLAIMS

1. A disc cartridge (100) comprising a planar casing (120) and a disc shaped media (108) accommodated therein; wherein, in use, the cartridge is inserted into a corresponding disc drive by first inserting a leading edge (102) of the casing through an aperture of such a disc drive in a direction (104) in the plane of the casing; and wherein the distance (b) from a trailing edge (112) of the casing (being that furthest from the leading edge) to an imaginary line (106) which is in the plane of the casing, perpendicular to the direction of insertion (104) and passes through the centre (110) of the disc shaped media is at least 10% greater than the distance (a) from the leading edge (102) of the casing to the imaginary line (106).

5

10
2. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 25% greater than the distance from the leading edge of the casing to the imaginary line.

15
3. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 50% greater than the distance from the leading edge of the casing to the imaginary line.

20
4. A cartridge as claimed in claim 1 wherein the distance from the trailing edge of the casing to the imaginary line is at least 80% greater than the distance from the leading edge of the casing to the imaginary line.

25
5. A cartridge as claimed in any preceding claim wherein in use in the drive unit, the casing has only a single layer of protection for the portion of the disc shaped media not exposed for access by a head.

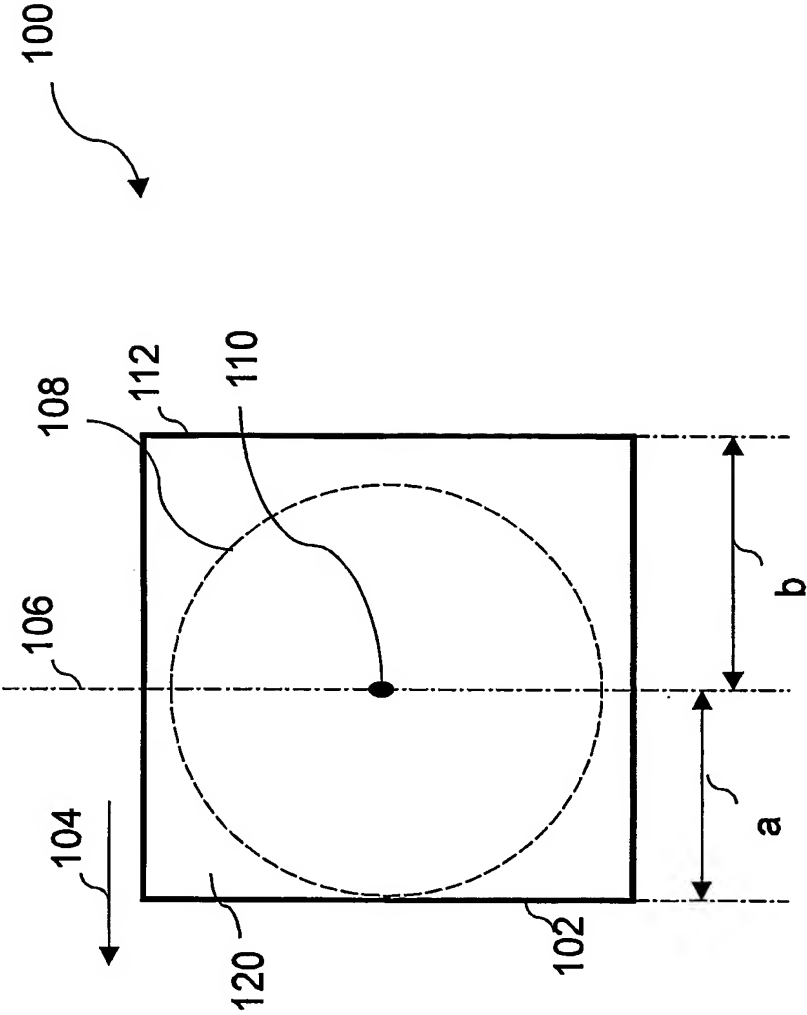


FIG.1

2/4

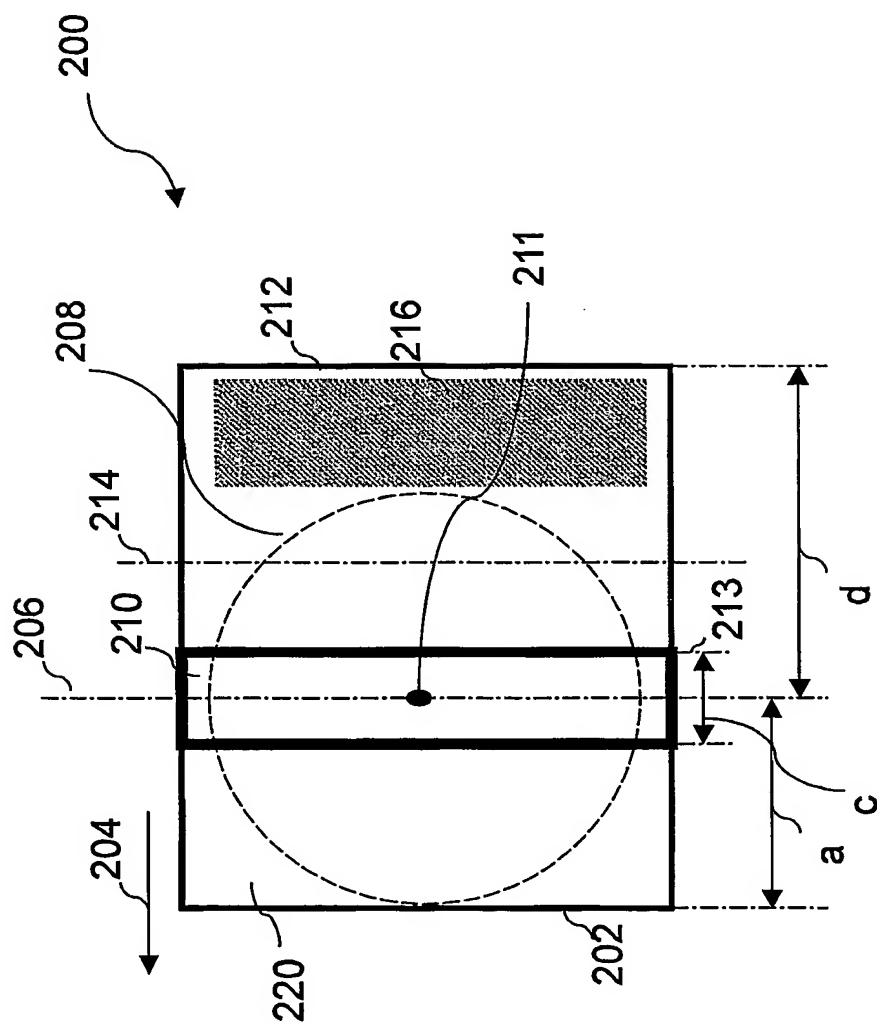
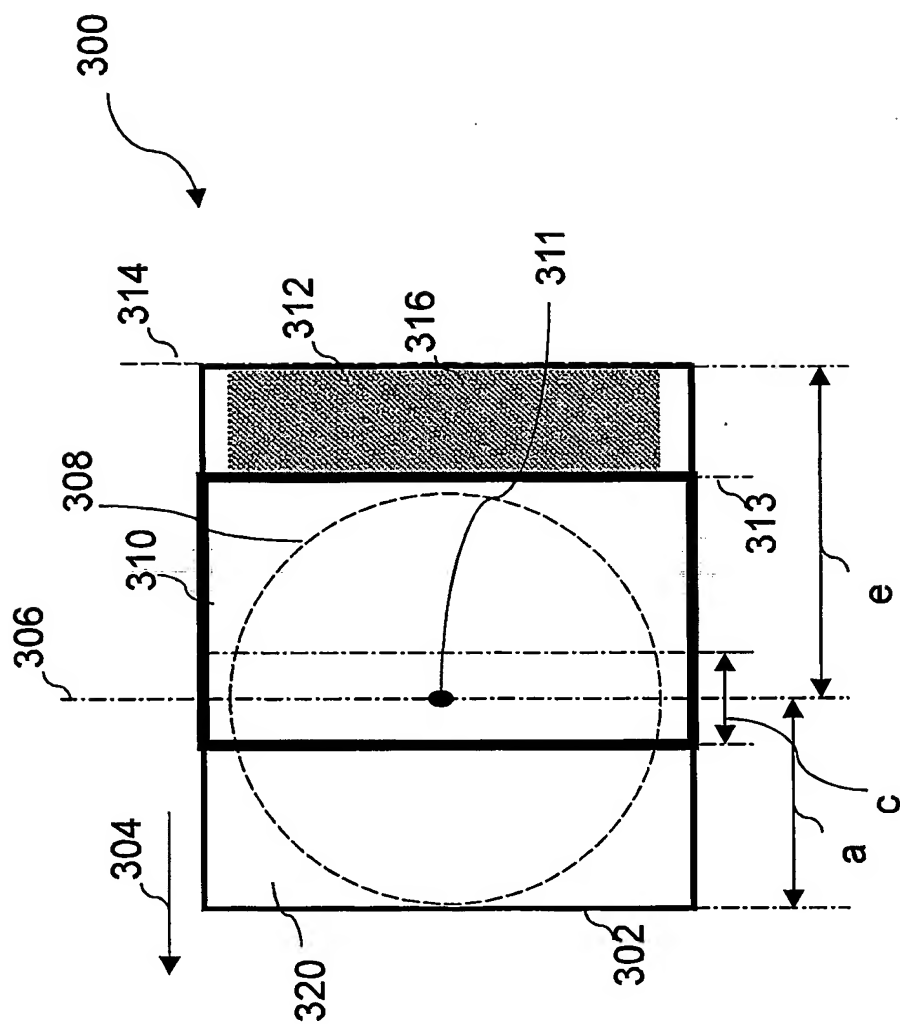


FIG. 2



**FIG. 3**

4/4

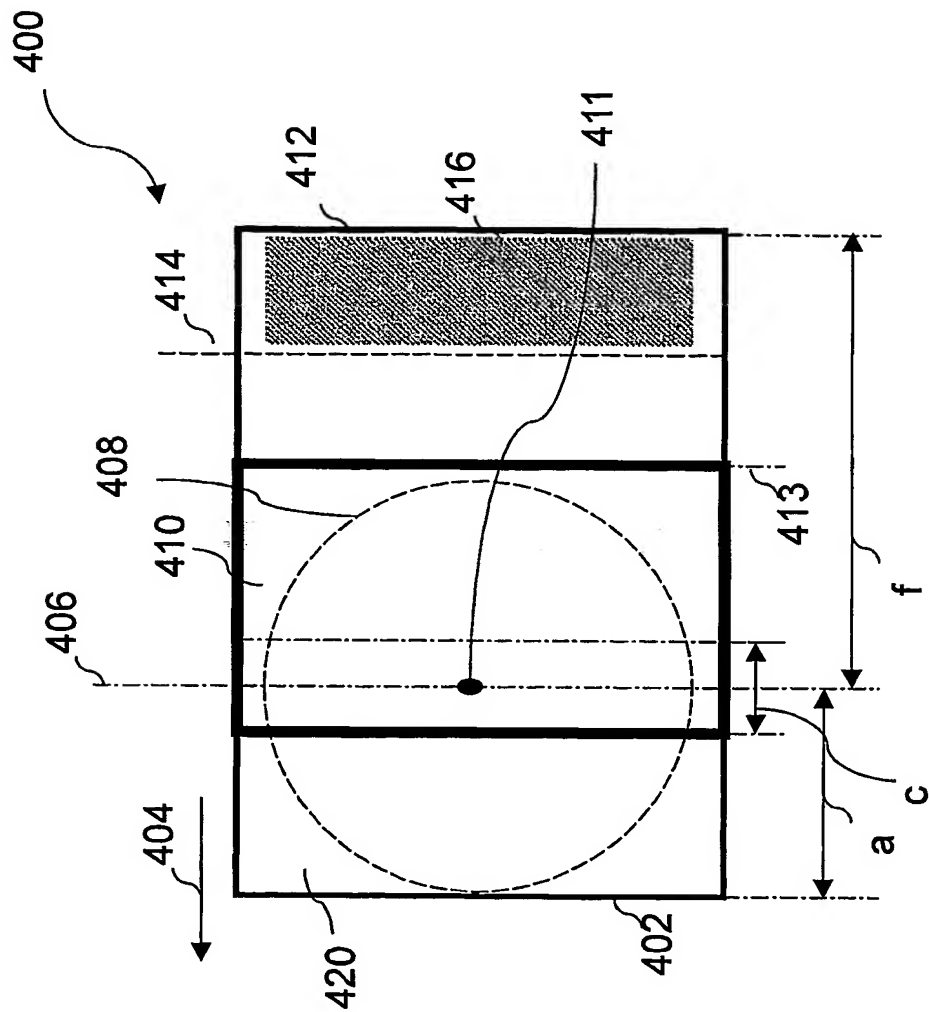


FIG. 4

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 03/03347

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 G11B23/03

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 21219 A (MEM CARD COMPUTER MEMORY SYSTE ;WEINBERGER ZVI (IL); HOZATSKY LEV) 12 June 1997 (1997-06-12) page 4, line 24 -page 10, line 24; figures ---	1-5
X	US 4 525 758 A (NAKAGAWA KOICHIRO ET AL) 25 June 1985 (1985-06-25) column 2, line 45 -column 8, line 3; figures ---	1-5
X	PATENT ABSTRACTS OF JAPAN vol. 011, no. 248 (P-604), 13 August 1987 (1987-08-13) -& JP 62 054881 A (SONY CORP), 10 March 1987 (1987-03-10) abstract; figures --- -/--	1-5

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- \*G\* document member of the same patent family

Date of the actual completion of the international search

12 November 2003

Date of mailing of the international search report

02/12/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Declat, M

## INTERNATIONAL SEARCH REPORT

International Publication No

PCT/IB 03/03347

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 420 112 A (HITACHI LTD) 3 April 1991 (1991-04-03) column 21, line 44 - column 23, line 36 column 27, line 5 - line 51; figures ---	1-5
X	EP 0 431 489 A (HITACHI LTD) 12 June 1991 (1991-06-12) column 19, line 16 - line 36 column 22, line 8 - line 27; figures ---	1-5
A	EP 0 484 788 A (HITACHI LTD) 13 May 1992 (1992-05-13) abstract; figures ---	1-5
A	EP 0 432 779 A (HITACHI LTD) 19 June 1991 (1991-06-19) abstract; figures ---	1-5
A	EP 1 001 422 A (SANYO ELECTRIC CO) 17 May 2000 (2000-05-17) abstract; claims 1-4; figures -----	1-5



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 03/03347

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9721219	A	12-06-1997	IL 116241 A AU 7586296 A EP 0864152 A1 WO 9721219 A1 JP 2001500301 T US 6021030 A	31-12-1999 27-06-1997 16-09-1998 12-06-1997 09-01-2001 01-02-2000
US 4525758	A	25-06-1985	JP 1248732 C JP 57210486 A JP 59025301 B JP 1284510 C JP 57212669 A JP 60008546 B JP 57212625 A JP 1284518 C JP 58108070 A JP 60008547 B AU 544979 B2 AU 8492582 A CA 1189616 A1 DE 3222844 A1 FR 2508220 A1 GB 2103862 A ,B IT 1148967 B KR 8501462 B1 NL 8202480 A ,B, NL 8802984 A	25-01-1985 24-12-1982 16-06-1984 09-10-1985 27-12-1982 04-03-1985 27-12-1982 09-10-1985 28-06-1983 04-03-1985 27-06-1985 23-12-1982 25-06-1985 27-01-1983 24-12-1982 23-02-1983 03-12-1986 05-10-1985 17-01-1983 03-04-1989
JP 62054881	A	10-03-1987	JP 1911694 C JP 6036296 B	09-03-1995 11-05-1994
EP 0420112	A	03-04-1991	JP 3113832 A JP 3254446 A AU 624532 B2 AU 6301590 A CA 2025724 A1 CN 1050634 A DE 69032850 D1 DE 69032850 T2 EP 0420112 A2 US 5274612 A US 5475656 A	15-05-1991 13-11-1991 11-06-1992 11-04-1991 28-03-1991 10-04-1991 04-02-1999 12-05-1999 03-04-1991 28-12-1993 12-12-1995
EP 0431489	A	12-06-1991	JP 2804130 B2 JP 3198224 A AU 3684393 A AU 6770890 A CA 2031672 A1 DE 69032001 D1 DE 69032001 T2 EP 0431489 A2 EP 0802530 A2 US 5583840 A	24-09-1998 29-08-1991 17-06-1993 29-08-1991 07-06-1991 05-03-1998 18-06-1998 12-06-1991 22-10-1997 10-12-1996
EP 0484788	A	13-05-1992	AU 638876 B2 AU 8687691 A CA 2054316 A1 CN 1061484 A ,B	08-07-1993 11-06-1992 06-05-1992 27-05-1992

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Publication No

PCT/IB 03/03347

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0484788	A		DE 69129616 D1	23-07-1998
			DE 69129616 T2	15-10-1998
			EP 0484788 A2	13-05-1992
			JP 3288733 B2	04-06-2002
			JP 5006569 A	14-01-1993
			KR 230529 B1	15-11-1999
			US 5311494 A	10-05-1994
<hr/>				
EP 0432779	A	19-06-1991	JP 2781625 B2	30-07-1998
			JP 3185630 A	13-08-1991
			AU 627093 B2	13-08-1992
			AU 6779990 A	08-08-1991
			CA 2031642 C	16-05-1995
			CN 1053317 A ,B	24-07-1991
			DE 69030429 D1	15-05-1997
			DE 69030429 T2	04-09-1997
			EP 0432779 A1	19-06-1991
	US 5317556 A	31-05-1994		
<hr/>				
EP 1001422	A	17-05-2000	JP 2000156061 A	06-06-2000
			EP 1001422 A2	17-05-2000